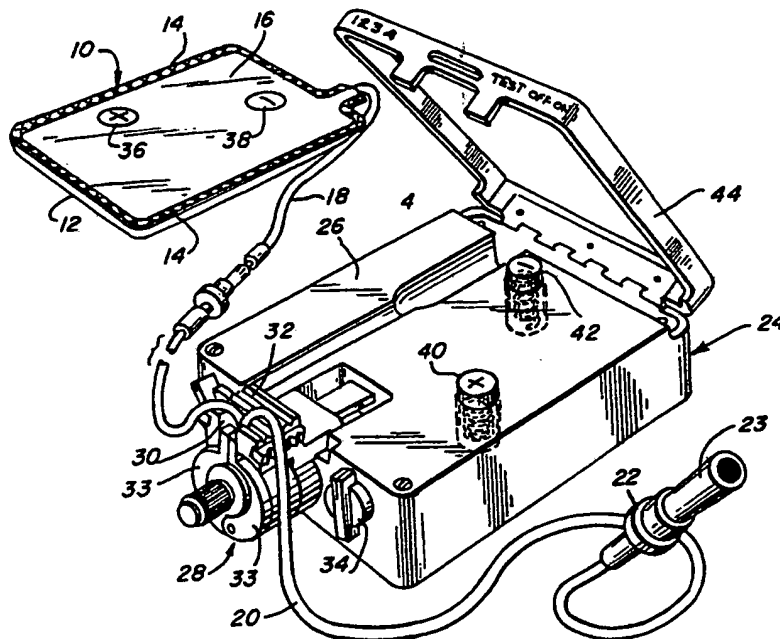




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(54) Title: SOLUTION CONTAINER HAVING INTEGRAL POWER SOURCE



(57) Abstract

A flexible, collapsible solution container (12) carries battery means (16) permanently attached to the solution container with the terminals (36), (38) of the battery being accessible to connect with electrically operated pump means (24) for pumping the contents of the solution container.

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SOLUTION CONTAINER HAVING INTEGRAL POWER SOURCETechnical Field and Prior Art

5 In the patent application of Harry W. Cromie, Serial No. 243,540, filed March 13, 1981, and entitled "MINIATURE ROTARY INFUSION PUMP WITH SLIDE LATCH AND DETACHABLE POWER SOURCE", a wearable pump design is disclosed for providing measured amounts of parenteral solution on a continuous basis to a patient. The parenteral solution may be carried in a bag which, in turn, is carried with the pump. Similarly, Olson U. S. Patent 10 Application Serial No. 380,977, filed May 24, 1982, discloses a pressure pump for fluids having jaws and end slots, being an alternate design of a pump having similar purposes as the pump of the Cromie application.

15 In the devices disclosed in the above two patent applications, and other known devices similar in concept to them, the pump is electrically operated and, typically, a single bag of solution is used by a patient over a 24 hour period for the controlled administration of cancer chemotherapeutic agent, analgesic, insulin, or other desired medication. In the prior 20 art, such pumps have carried batteries to power the pumping action over the 24 hour period.

Unfortunately, it has been found that in some instances patients neglect to change the batteries in the pump as often as is desired, with the result that the battery in the pump will go 25 dead during the middle of the day, causing the continuous, long-term administration of critical medication to stop. This may not be noted by the patient for a substantial period of time, since a major purpose of pumps of the type described is to permit the patient to operate independently throughout the day, away from the hospital or any other medical supervision in his 30 everyday activities.

The consequent failure of administration of critical medication for a period of hours may well result in a



significant medical setback for the patient, all because of his absentminded failure to replace the batteries of the pump.

In accordance with this invention, an alternate power system for the pumping of solutions to and from flexible collapsible containers is provided, being set up so that the patient cannot
5 make the mistake of failing to change the batteries. Thus, the patient is better protected against accidental oversights on his part, and the critical medication can be provided to an independently living patient with greater reliability of administration and less medical supervision. This is
10 accomplished by attaching the battery to the flexible, collapsible solution container so that the two are used as a single disposable unit. Accordingly, each flexible solution container of critical medication is administered by the pump
15 being powered by a fresh battery every time, thus avoiding unnecessary and potentially critical failures of power in the pump systems.

The invention can also be used in other areas, for example, for the administration of large volumes of parenteral solution
20 (a liter or more) to ambulatory patients.

Description of the Invention

In accordance with this invention, a flexible, collapsible solution container and battery means having terminals are
25 permanently attached together, with the terminals being accessible to connect with electrically operated pump means for pumping the contents of the solution container.

In one embodiment, the battery means may be carried within a compartment of the container, the compartment being separate
30 from the solution carried in the container.

In another embodiment, the solution container and battery means may be permanently attached together in peripherally sealed, side-by-side relation. The battery means may preferably be relatively flat, defining a length and width which are at



least four times greater than its thickness, and, in the second embodiment described above, the terminals may be positioned on the face of the battery which is opposed to the solution container.

5 Flat batteries of the type described are commercially available from the Polaroid Company and may be modified by conventional means to be used in accordance with this invention, particularly in one of the embodiments described above.

10 Description of the Drawings

In the drawings, Figure 1 is a perspective view of the flexible collapsible solution container and attached battery means of this invention in the process of being installed in electrically operated pump means, for daylong, parenteral application of a critical medication to a patient who will carry the operating pump and solution container with him throughout the day while the critical medication is administered through an intravenous catheter on a controlled, continuous basis.

15 Figure 2 is a perspective view showing the bag and battery installed in the pump of Figure 1, so that the pump now is ready for attachment to the patient's intravenous catheter.

Figure 3 is a plan view of another embodiment of the collapsible solution container and attached battery of this invention.

25 Description of Specific Embodiments

Referring to Figures 1 and 2, the combined flexible, collapsible solution container and battery 10 of this invention is disclosed, with solution bag 12 being typically made in generally conventional manner of a pair of heat-sealed thermoplastic sheets of plastic such as polyvinyl chloride, with the heat sealing taking place at periphery 14. Flat battery 16, of a type which is available from the Polaroid Corporation, is carried on top of bag 12 as shown in Figure 1, and sealed



thereto at periphery 14. This sealing may be accomplished by an ultrasonic welding technique, a solvent sealing technique, or use of an adhesive around the periphery 14, or, if desired, between the adjoining faces of bag 12 and battery 16, to render them permanently attached together.

As shown, bag 12 carries connection tube 18 which, in turn, may connect to transfer set 20 of conventional design which, in turn, may terminate with an IV needle or a luer lock adaptor 22 as may be desired, to either make an IV connection with the patient or a connection with an indwelling IV catheter so that critical medication of bag 12 may be transferred to the patient. Luer lock adaptor 22 is covered with removable protector 23.

Pump 24 may be of a design as described in the cited patent applications, and specifically the above-cited Olson patent application, except as otherwise described herein.

Housing 26 is provided which carries pump head 28 which may be of the design of the previously cited Olson patent application, with the further modification that a notch 30 is provided in latch 32 which locks and unlocks pivotable jaws 33, within which a portion of tubing 20 is provided. Tubing 20 surrounds a pressure head (not shown) which moves in a circular path of motion, compressing tubing 20 against the closed jaws 33 in the circular path of motion, and thus forcing solution downstream through adaptor 22 at a predetermined rate of flow as governed by pump control 34.

Battery 16 carries terminals 36, 38. The combined battery and collapsible container 10 may be placed into pump housing 26, inverting the structure from the position shown in Figure 1 so that terminals 36, 38 enter respectively into contact with spring terminals 40, 42 mounted in housing 26 as shown. Terminals 40, 42 connect to an electric motor in housing 26 for operating pump head 28. Tubing 18 and the adjacent section of tube 20 may be placed in trough 43, and lid 44 may be closed to achieve the configuration of Figure 2. The loaded pump may then



be connected to the patient for precisely controlled administration of solution by pump 24 over an extended period of time, without risk of the battery going dead during the middle of the administration process.

5 Referring to Figure 3, another embodiment of bag and attached battery is disclosed. As shown, a two-chamber plastic bag 50 made in an overall conventional manner, for example, from a pair of peripherally heat sealed sheets of plastic and a transverse heat seal 52, defines a pair of chambers 54, 56. 10 Chamber 54 is the chamber for the desired solution for administration and communicates with port tubing 58 which, in turn, can communicate with a transfer set 20 if desired.

Chamber 56, isolated from solution chamber 54, carries a battery 58 which may be of the flat type, or may be another 15 conventional type of battery, having terminals 60 protruding from the end of bag 50 for communication with a cable or wire communicating with the pump system to provide power thereto.

Bag 50 can fold along line 62, if desired for insertion into a storage chamber of a pump for ambulatory use.

20 The above has been offered for illustrative purposes only and is not intended to limit the scope of the invention of this application, which is as defined in the claims below.



THAT WHICH IS CLAIMED IS:

1. In combination, a flexible, collapsible solution
container and battery means having terminals, said solution
5 container and battery means being permanently attached together
with said terminals being accessible to connect with
electrically operated pump means for pumping the contents of
said solution container.
- 10 2. The container and battery means of Claim 1 in which said
battery means is carried within a compartment of said container,
said compartment being separate from the solution carried in
said container.
- 15 3. The container and battery means of Claim 1 in which said
battery means defines a length and width which are at least four
times greater than its thickness.
- 20 4. In combination, a flexible, collapsible solution
container and battery means having terminals, said solution
container and battery means being permanently attached together
in peripherally sealed side-by-side relation, said battery means
defining a length and width which are at least four times
greater than its thickness, said terminals being accessible to
25 connect with electrically operated pump means for pumping the
contents of said solution container.
- 30 5. The container and battery means of Claim 4 in which said
terminals are positioned on the face of said battery which is
opposed to said solution container.
6. The container and battery means of Claim 5 in which the
periphery of said battery means is sealed to the periphery of
said container.



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FIG. 1

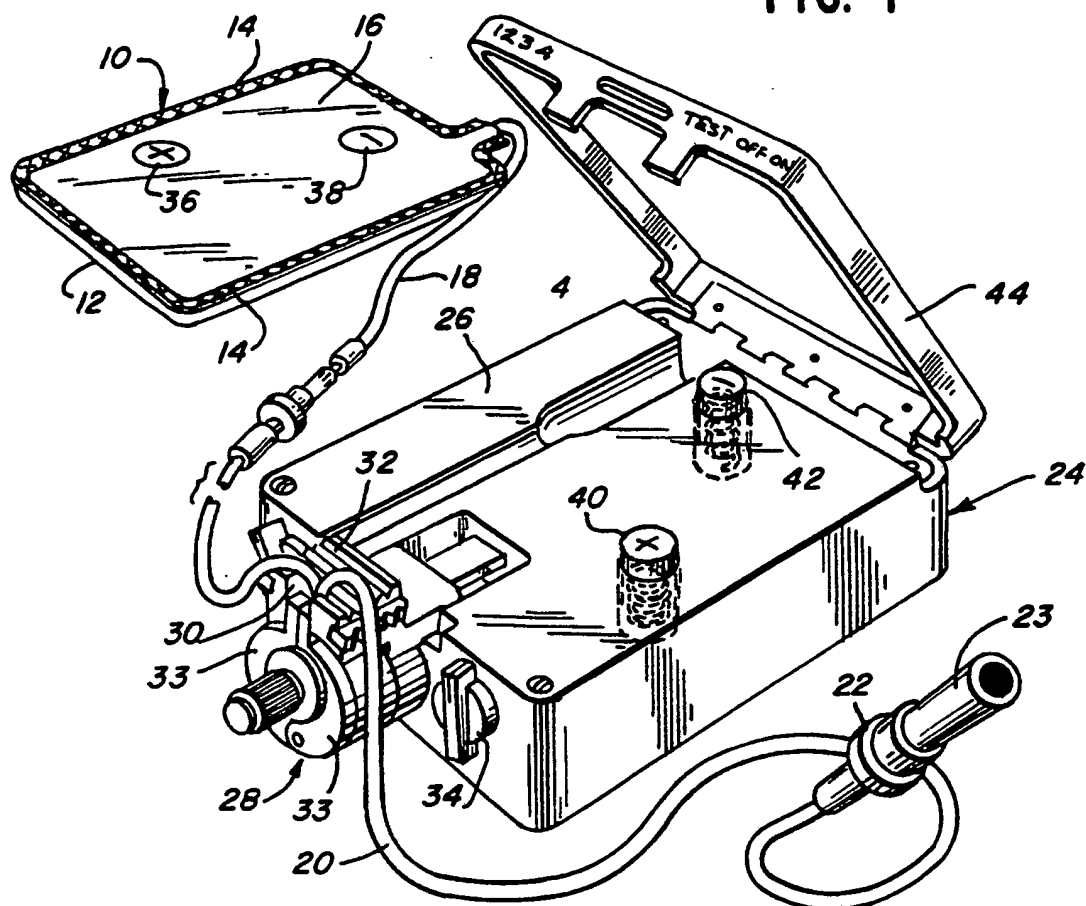
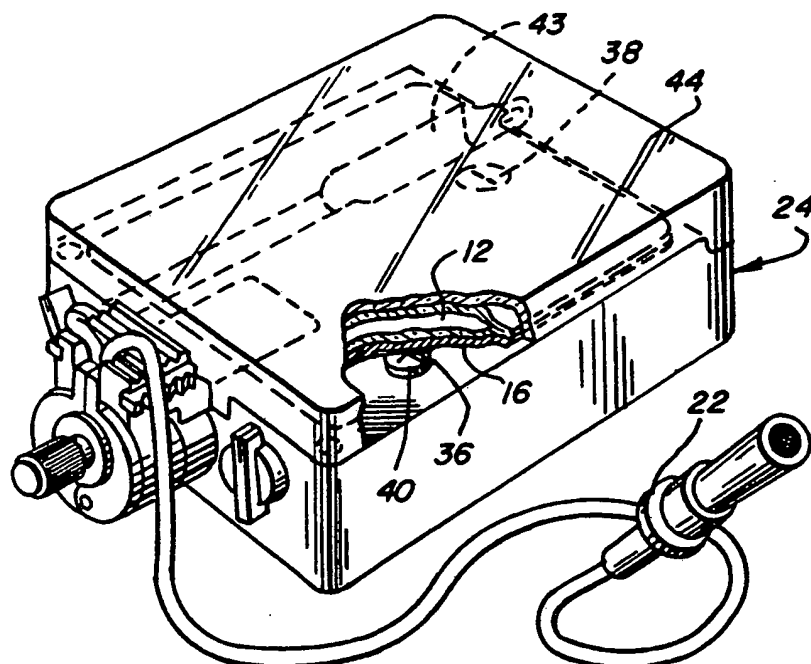
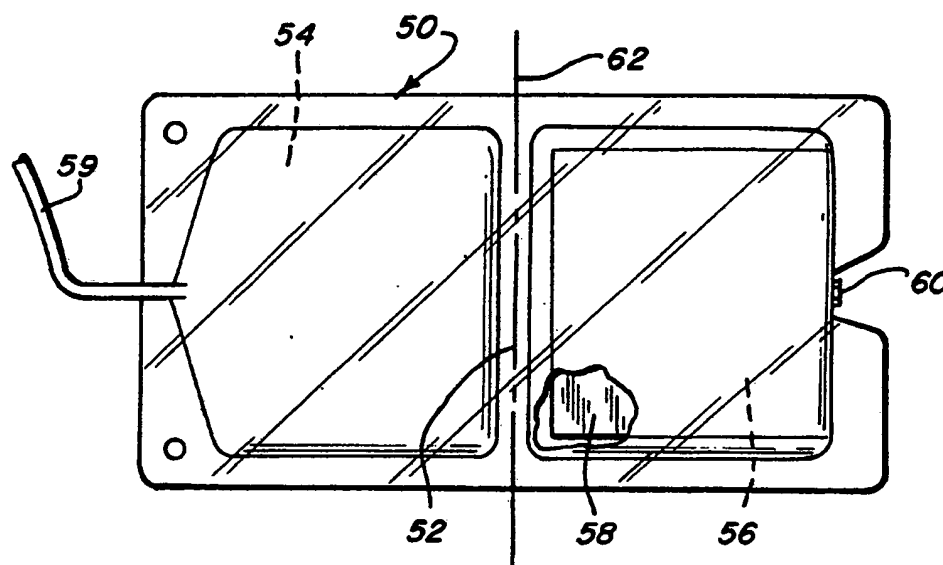


FIG. 2



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FIG. 3



INTERNATIONAL SEARCH REPORT

International Application No PCT US84/00526

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ³			
According to International Patent Classification (IPC) or to both National Classification and IPC			
Int. Cl. ⁸ A61M 5/00 H01M 6/12			
U.S. Cl. 604/262, 429/162			
II. FIELDS SEARCHED			
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Classification System	Classification Symbols		
U.S.	604/153, 151, 262 429/162, 163 128/419P, 419PS, 1R 354/275, 276		
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁵			
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴			
Category ⁶	Citation of Document, ¹⁶ with indication, where appropriate, of the relevant passages ¹⁷		Relevant to Claim No. ¹⁸
Y	US, A, 3,967,292 29 June 1976 DELAHUNT		1-6
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Date of the Actual Completion of the International Search ²		Date of Mailing of this International Search Report ²	
20 June 84		26 JUN 1984	
International Searching Authority ¹		Signature of Authorized Officer ²⁰	
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